

## Pattern-based OCX components for the electronic patient record

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### INTRODUCTION

The Federal University of São Paulo has an academic hospital of about 800 beds. It has a legacy system in Cobol on a mainframe, responsible by the hospital administrative functions. In parallel, a TCP/IP network with about 500 clients offers Internet/Intranet services to the academic community. A new hospital information system (HIS) to support patient care, research and education, based on an open architecture, is under development. The first design decision was to agree upon a robust software architecture to keep up with a five year development. In addition, it was decided that, whenever possible, the design would incorporate available patterns and standards for the representation of healthcare data. The next sections give an overview of this architecture detailing the middleware layer where the software components reside. A description of the two components already defined is presented: OCXDCN and the OCXDescriptor.

### METHODS

#### OCXDCN - Browser for Corporate Dictionaries

The first software component designed was the one responsible for the domain corporate dictionaries. Its main objective is to offer an OLE object that can navigate into hierarchical structures that reside in relational databases. Its design was based on the *Composite* and the *Adapter* patterns described by the *GoF*<sup>1</sup>.

The major OCXDCN features can be observed by the extensive list of methods it offers to the developers. There are methods to establish a database connection, methods to navigate in the hierarchical structure and methods to query the structure. OCXDCN is being exhaustively used since August 96, to support applications that deals with the following corporate dictionaries: ICD9, ICD10, Drugs used in Hospital São Paulo,

Echo - a local vocabulary that contains the sequential analysis for congenital heart diseases, ATC - Anatomical Therapeutical Classification for drugs, and AMB - Brazilian Medical Association codes for medical procedures and SUS - Brazilian Social Healthcare table to define medical procedures.

#### OCXDescriptor

OCXDescriptor is a design pattern that aims to encapsulate most of the knowledge necessary to deal with medical descriptors used to build the electronic patient record. To model this component the *Observations* and *Measurements* design patterns, proposed by Fowler<sup>2</sup>, was extended to fit our needs. This pattern allows developers to describe any medical concept, either *quantitative* or *qualitative*.

OCXDescriptor is presently being successfully used to develop several departmental applications for the new HIS.

### CONCLUSION

The experience on developing software components had been most rewarding. The components ability to encapsulate the complexity, giving an illusion of simplicity empowered the development team. It seems clear that the trends on software development are pointing out to a universe of distributed objects, offering all different types of interfaces in a worldwide basis.

### References

1. Gamma E., Helm R., Johnson R., Vlissides J. Design Patterns - Elements of Resusable Object-Oriented Software. Addison Wesley Publishing Company, Reading, Massachusetts, 1995. Pg 163
2. Fowler M. Analysis Patterns. Addison Wesley Publishing Company, Reading, Massachusetts, 1997.